

REMARKS

Claims 1-15, 17-41 and 43 are pending. Claims 16 and 42 are cancelled. Claim 43 replaces Claim 42 by rewriting Claim 42 in dependent form.

Claims 14-15 and 19-41 have been withdrawn in view of a restriction requirement.

I. Claim Amendments

Claims 1-13 and 16-18 and 42 are rejected under 35 USC §112, second paragraph. Claims 7 is amended and Claim 42 replaced by Claim 43 in response to this rejection.

Claim 10 is amended, Claim 16 is cancelled, and Claim 17 is amended, consistent with the amendments to base Claim 7 made in response to the non-final Office action of March 29, 2005. For example, Claim 10 was amended to replace “isomers thereof” with the isomer recited by base Claim 7. Thus, these amendments present no new matter or new issues requiring a search.

II. 35 USC 102/103 Rejection in View of Fink et al.

Claims 1-13, 16-18 and 42 are rejected under 35 USC §102 as being anticipated, or in the alternative under 35 USC 103 as being unpatentable, in view of Fink et al. (US 4,542,175).

In view of a species election, applicants elected the species of claims 1-13 and 16-18 and 42, exemplified in Example 1 of the specification (page 139). This species is a poly(HEA-co-DMAM-co-AA) terpolymer. HEA is 2-hydroxyethyl acrylate; DMAM is 2-(dimethylamino)ethyl methacrylate; and AA is acrylic acid.

The Office action asserts Fink et al. (col. 5, line 3 to col. 6, line 42) disclose terpolymers comprising DMAM, HEA and AA. This rejection is respectfully traversed.

As stated in the concurrently filed Rule 132 Declaration the presently claimed invention distinguishes over Fink et al. The materials taught by Fink et al. are not going to be soluble in a water solution such as the presently claimed polymers, e.g., poly(HEA-co-DMAM-co-AA) terpolymer. For example, use of a butyl acrylate monomer by Fink et al. will make the polymer too hydrophobic as demonstrated in Examples 1-7c of Fink et al. in Col. 10. Further examples in Fink et al., do not use butyl acrylate, but do use ethyl acrylate and methacrylate and not going to be soluble in a water solution.

Fink et al., col. 5, lines 27-30, mentions dimethylaminoethyl methacrylate but only to assert

polymers of dimethylaminoethyl methacrylate are not preferred. In particular, Fink et al. states the following:

“Those esters which contain an ethylene group as R1 give dispersions which have a tendency to thicken even above a pH of 7 and, to be sure, tend all the more to thicken the smaller the total alcohol portion of the ester is. For this reason, dispersions of polymers containing dimethylaminoethyl methacrylate are not among the preferred embodiments of the invention.”

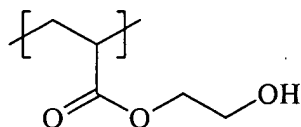
Thus, Fink et al. teaches away from the present invention.

Fink et al., col. 5, lines 65-col. 6, line 6, discloses homopolymers are suitable “to the extent they meet the requirements earlier described. However, this is not always the case Thus, copolymers are often employed” However, Fink et al. does not teach the presently elected copolymer species of DMAM, HEA and AA. Col. 5, lines 27-30 of Fink fails to state whether homopolymers or copolymers of dimethylaminoethyl methacrylate were tested to determine that it is not preferred. Thus, there is no teaching to use DMAM in a copolymer.

Also, Fink et al. mentions hydroxyethyl acrylate at col. 6, lines 26-29 in its list of readily water soluble comonomers (C) but only as one of many potential copolymer moieties. Also, col. 6, lines 32-37 states:

“Comonomers having carboxyl or carboxylate groups, such as acrylic, methacrylic, maleic, fumaric, and itaconic acids and their water soluble salts, can in many cases have a disadvantageous effect on the thickening properties because of their mutual interaction with the basic nitrogen atom. Thus, the preferred polymers of the present invention are those which are completely free of carboxyl and all other acid groups, i.e. are comprised solely of basic monomers (A) and neutral monomers (B) and (C), all free of acid groups.”

Hydroxyethyl acrylate has the formula:



Thus, it has the non-preferred carboxyl group “C=O” and is one of the salts of acrylic acid which are taught to be disadvantageous in many cases.

Furthermore, as stated in the above-provided quote from Fink et al., acrylic acid is specifically mentioned as being disadvantageous in many cases.

Moreover, Fink et al., col. 6, lines 43-46, states, “The monomers of groups (A), (B), and (C) cannot be chosen arbitrarily. Rather, their choice requires a careful balancing in order to meet the aforementioned requirements.”

Thus, since Fink et al. fails to even disclose whether it tested a homopolymer or a copolymer of DMAM, it does not direct one skilled in the art to select DMAM as a homopolymer or a copolymer. Moreover, even if it did suggest using DMAM, there is no teaching to combine this non-preferred moiety with HEA, which is taught to be disadvantageous in many cases, and acrylic acid which is taught to be disadvantageous in many cases, to arrive at the DMAM-HEA-AA copolymer species elected for examination from the present invention.

III. Dependent Claims Further Distinguish Over Fink et al.

A. Cationic Charge Density

Fink et al. does not teach to obtain the selected charge densities of present Claims 1 and 2. Claim 1 recites an average cationic charge density of 2.77 or less units per 100 daltons molecular weight at a pH of from about 4 to about 12. Claim 2 recites an average cationic charge density from about 0.01 to about 2.75 units per 100 daltons molecular weight at a pH of from about 4 to about 12.

Paragraph 5 of the concurrently filed Rule 132 Declaration (by an apparent typographical error it is entitled a “Rule 123 Declaration”) explains that the present invention explains co- and terpolymers which contrast with the compounds of Fink et al. The charge density of the present amine based polymers is critical for suds stabilization via favorable polymer interactions with soils, thus preventing soil antifoam effects. As wash pH varies so can the cationic charge density which can cause negative interactions with any anionic surfactant that is present, leading to a loss of suds. To reduce the cationic charge and pH dependence of the soil/polymer interaction for the polymer, several alternative mechanisms, together with cationic charge, to increase polymer/soil

interactions may be used. They are: 1) lower the overall charge density to minimize cationic charge and pH dependence on the polymer/soil interaction via the introduction of non-charged co-monomers with dimethylaminoethyl methacrylate, and 2) increase hydrophobicity to drive the soil/polymer interaction away from electrostatic and closer to hydrophobic interaction via more hydrophobic non-charged co-monomers with dimethylaminoethyl methacrylate.

The concurrently filed Rule 132 Declaration shows data for co-monomers such as hydroxy ethyl acrylate, hydroxy propyl acrylate, hydroxy butyl acrylate, poly(ethylene glycol) acrylate and acrylic acid added to dimethylaminoethyl methacrylate.

Paragraph 9 of the Declaration explains data showing that lowering the overall charge density to minimize cationic charge and pH dependence of the polymer/soil interaction via the introduction of non-charged co-monomers with dimethylaminoethyl methacrylate facilitates improved sudsings and mileage against proteinaceous soils. Increased hydrophobic non-charged co-monomers with dimethylaminoethyl methacrylate can be seen with the progressive increase in hydrophobicity of the co-monomers (e.g., hydroxy ethyl acrylate < hydroxy propyl acrylate < hydroxy butyl acrylate). However, too much hydrophobicity can make the polymer insoluble or slightly insoluble which causes a composition to be hazy or cloudy.

Paragraph 10 of the concurrently filed Declaration explains data showing the present invention also increases hydrophobicity to drive the polymer/soil interaction away from electrostatic and closer to hydrophobic interaction via more hydrophobic non-charged co-monomers with dimethylaminoethyl methacrylate to facilitate improved sudsing and mileage against greasy soils.

B. Molecular Weight

The Office action asserts against Claim 5 that “Oshibe et al. (*sic.* should have cited Fink et al.) inherently possess the claimed molecular weight limitation because the claimed molecular weight range just about covers all possible molecular weight of a free radically prepared terpolymer.” The mentioning of Oshibe et al., which is not part of this rejection and was shown to be irrelevant by the Amendment filed June 29, 2005, is an apparent typographical error.

However, this overlooks that Claim 6 recites the copolymer has a molecular weight of about 10,000 to about 100,000 daltons. In contrast, the Fink et al., Abstract and col. 2, lines 44-45, state its synthetic polymer has a molecular weight of at least 500,000. A dalton is, “A unit of mass

in biology; $1/12$ the mass of an atom of carbon-12 = $1,661 \times 10^{-24}$ g.” *Grant & Hackh’s Chemical Dictionary*, Fifth Edition, McGraw-Hill Inc. (1987). Thus, Fink et al. teaches away from Claim 6.

C. Acrylic acid-containing terpolymer

It is also respectfully submitted that Claim 17, which recites acrylic acid-containing terpolymers, further distinguishes from the cited reference. As stated above, Fink et al. expressly teaches acrylic acid moieties are disadvantageous in many cases.

IV. Information Disclosure Statements

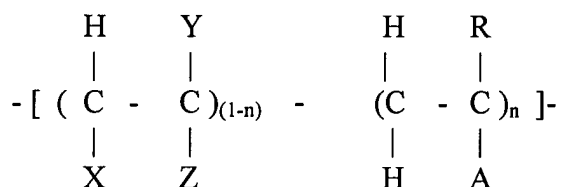
Applicant submitted an Information Disclosure Statement October 14, 2005. This was after the date the present Final Office action was mailed. Thus, applicant requests the references in this IDS be made of record.

Applicant also submits a new Information Disclosure Statement concurrently with this Amendment to cite ZA 6805954, JP 58-013700 and GB 2104091 which corresponds to JP ‘700, and the Office action from co-pending US patent application no. 10/921,324 based on US 09/699,522, citing the Abstract of ZA ‘954 and JP ‘700.

ZA ‘954 discloses quaternary ammonium detergent copolymers. These quaternary ammonium detergent copolymers do not anticipate the copolymer of present Claim 1. Neither monomer (i) nor monomer (ii) of the copolymer of present Claim 1 is a quaternary ammonium unit.

The Office action in US patent application no. 10/921,324 asserts ZA ‘954 (Abstract) discloses diethylaminoethyl methacrylate. However, ZA ‘954 actually discloses 2-methyl-, 2-(diethylamino)ethyl ester homopolymer. In contrast, the presently elected species is a poly(HEA-co-DMAM-co-AA) terpolymer. HEA is 2-hydroxyethyl acrylate; DMAM is 2-(dimethylamino)ethyl methacrylate; and AA is acrylic acid. Moreover, the present claims do not recite homopolymers. Also, the concurrently filed Rule 132 Declaration shows the unexpected advantages the presently selected terpolymer species has over DMAM homopolymer.

JP ‘700 (GB ‘091) discloses a detergent containing 0.1 to 10 percent by weight of an amphoteric copolymer. The left column of page 2 of JP ‘700 (page 1 of GB ‘091) discloses the following copolymer:



and the list of substituents appears to permit, among other things, X as -H; Y as -CH₃; Z as -COO(CH₂)₂ - N(R₄)(R₅), wherein R₄ and R₅ may be C₁ to C₃; R may be -H or -CH₃; and A may be any of a list of nitrogen containing substituents. Also, Synthesis 1 of Table 1 from JP '700 (GB '091) provides a copolymer of acrylic acid (AA) and dimethylaminoethyl methacrylate (DMAEMA) made in a 1:1 molar ratio. However, the structural formula does not permit a combination of DMAM and HEA so it is not the presently selected terpolymer species.

V. Additional Information

Applicant notes US 4304703 to Das, already of record, col. 4, lines 9-47, discloses polymers made from ethylenically unsaturated basic amino compounds. Das, Col. 9 discloses an example with styrene, dimethylamino methacrylate, hydroxyethyl acrylate, t-dodecyl mercaptan and VASO 64.

In contrast to this example of Das the elected species is a poly(HEA-co-DMAM-co-AA) terpolymer. HEA is 2-hydroxyethyl acrylate; DMAM is 2-(dimethylamino)ethyl methacrylate; and AA is acrylic acid.

It is noted that Claim 17 recites the polymer of Claim 7, selected from the group consisting of:

poly(HEA-co-DMAM-co-AA) terpolymer,
poly(HPA-co-DMAM-co-AA) terpolymer, and
poly(PEG-acrylate-co-DMAM-co-AA) terpolymer.

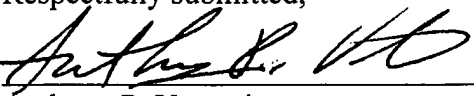
If the elected species is found allowable, it is respectfully requested a reasonable number of other species, for example, at least those of Claim 17, also be examined.

VI. Conclusion

In view of the above, it is respectfully submitted all objections and rejections are overcome.

Thus, a Notice of Allowance is respectfully requested.

Date: Feb. 27, 2006

Respectfully submitted,
By: 
Anthony P. Venturino
Registration No. 31,674

APV/bms

ATTORNEY DOCKET NO. APV30270CIP

STEVENS, DAVIS, MILLER & MOSHER, L.L.P.
1615 L STREET, N.W., SUITE 850
WASHINGTON, D.C. 20036
TEL. 202-785-0100 / FAX. 202-785-0200